Tangential inlet supersonic separators: a novel apparatus for gas purification - DTU Orbit (09/11/2017)

Tangential inlet supersonic separators: a novel apparatus for gas purification

A novel supersonic separator with a tangential inlet is designed to remove the condensable components from gas mixtures. The dynamic parameters of natural gas in the supersonic separation process are numerically calculated using the Reynolds stress turbulence model with the Peng-Robinson real gas model. The results show that natural gas expands in the supersonic separator to supersonic velocities resulting in low pressures (6 bar, from about 40 bar) and temperatures (-70 ˚C, from 30 ˚C), which causes the condensation and nucleation of the condensable components. The tangential velocity can be generated by the tangential inlet, and it increases to the maximum of 200 m/s at the nozzle throat due to decrease of the nozzle area of the converging part. The tangential velocity can maintain the value of about 160 m/s at the nozzle exit, and correspondingly generates the centrifugal acceleration of 3.6×106 m/s2 to remove the condensed droplets from the gas mixtures.

General information

State: Published
Organisations: Department of Mechanical Engineering, Fluid Mechanics, Coastal and Maritime Engineering, Changzhou University
Authors: Wen, C. (Intern), Walther, J. H. (Intern), Yang, Y. (Ekstern)
Number of pages: 6
Publication date: 2016

Host publication information

Title of host publication: Proceedings of 9th International Conference on Multiphase Flow
Main Research Area: Technical/natural sciences
Conference: 9th International Conference on Multiphase Flow, Firenze, Italy, 22/05/2016 - 22/05/2016
Supersonic separator, Tangential inlet, Gas purification
Source: PublicationPreSubmission
Source-ID: 125067006
Publication: Research - peer-review › Article in proceedings – Annual report year: 2016